

**AMENDMENTS TO THE CLAIMS**

Claims 1-19 (Canceled)

20. (New) An apparatus microfabricated for performing cell growth and/or cell based assays in a liquid medium, said apparatus comprising:
- a) a base plate supporting a plurality of micro-channel elements, each comprising a cell growth chamber, an inlet channel, and an outlet channel;
  - b) a cover plate positioned over said base plate said cover plate extending over said elements so as to define said chambers and channels; and
  - c) a hydrophobic barrier or valve in at least one of said chambers or said channels that is defined by positioning said cover plate over said base plate.
21. (New) The apparatus of claim 20 further comprising means, incorporated in said cell growth chamber, for cell growth, wherein one or more components of the apparatus are constructed of a gas permeable film or membrane such that CO<sub>2</sub>-buffered media can be used in the cell growth chamber and oxygen may permeate to the cells for their metabolism during growth.
22. (New) The apparatus of claim 20, wherein said valve comprises a localized region of hydrophobicity within said chamber or said channel.
23. (New) The apparatus of claim 20 further comprising a suspension of cells to be grown in each of said cell growth chambers.
24. (New) The apparatus of claim 23, wherein said cells require attachment to said cell growth chambers for growth.
25. (New) The apparatus of claim 20, wherein said base plate comprises a rotatable disc which is microfabricated to provide a sample introduction port located towards the center of the disc and connected to an annular sample reservoir, and wherein said micro-channel elements are radially dispersed on said disc with their respective input channels connected to receive sample from said reservoir.

26. (New) The apparatus of claim 20, wherein said cover plate is fabricated from a gas permeable plastic material.
27. (New) The apparatus of claim 26, wherein the plastic material is a silicone polymer, polyurethane or polytetrafluoroethylene.
28. (New) The apparatus of claim 27, wherein the silicone polymer is polydimethylsiloxane.
29. (New) The apparatus of claim 21, wherein said means for cell growth comprises at least a portion of a surface of said cell growth chamber that is treated to allow for cell attachment.
30. (New) The apparatus of claim 29, wherein said surface is negatively charged surface.
31. (New) The apparatus of claim 29, wherein said surface comprises a coating of polylysine, collagen or fibronectin.
32. (New) The apparatus of claim 21, wherein said means for cell growth comprises one or more microcarrier beads located in said cell growth chamber, wherein each of said microcarrier beads provides for cell attachment.
33. (New) The apparatus of claim 20, wherein said cell growth chamber comprises raised moulded features disposed on the base portion of said cell growth chamber to form pillars.
34. (New) The apparatus of claim 20, wherein the cross-sectional area of said inlet channel is greater than that of said outlet channel.
35. (New) The apparatus of claim 34, wherein the cross-sectional area of said outlet channel is between 0.99 and 0.01 times that of said inlet channel.
36. (New) The apparatus of claim 20, wherein at least some of said micro-channel elements each comprises one or more assay chambers for performing assays involving cellular constituents and connected in line between said cell growth chamber and said outlet channel.

37. (New ) The apparatus of claim 36, wherein each assay chamber is connected to each other and to said cell growth chamber by an intermediate channel in the order of: inlet channel, cell growth chamber, intermediate channel, assay chamber, outlet channel, and wherein the cross-sectional areas of the respective channels reduce progressively from the inlet channel to the outlet channel.
38. (New) The apparatus of claim 37, wherein the cross-sectional area of each intermediate channel and the outlet channel is between 0.99 and 0.01 times that of the immediately preceding upstream channel.
39. (New) The apparatus of claim 37, wherein there is provided in or on an interior surface of one or more of said chambers a layer comprising a scintillant substance.
40. (New) The apparatus of claim 39, wherein the layer comprising a scintillant substance comprises a binding moiety bound thereto, said binding moiety being a member of a specific binding pair selected from the group consisting of biotin, streptavidin, protein A, antibodies, lectins, hormone-receptors, nucleic acid probes, and DNA-binding proteins.
41. (New) A method for determining the effect of a test substance on a cellular activity or physical parameter, which method comprises the steps of:
- a) providing an apparatus comprising;
    - 1) a base plate supporting a plurality of micro-channel elements, each comprising a cell growth chamber, an inlet channel, and an outlet channel;
    - 2) a cover plate positioned over said base plate said cover plate extending over said elements so as to define said chambers and channels; and
    - 3) a hydrophobic barrier or valve in at least one of said chambers or said channels that is defined by positioning said cover plate over said base plate;

b) introducing said cells into said apparatus and causing said cells to be transported to one or more cell growth chambers in said apparatus;

c) culturing said cells in one ore more cell growth chambers

d) providing one or more samples of test substances whose effect upon the cells is to be measured under conditions so as to cause said cells to be exposed to said substances;  
and

e) determining the effect of the test substances on said cells by means of optical detection.

42. (New) The method of claim 41, wherein the cells are cultured within the apparatus prior to the introduction of the test substances.

43. (New) The method of claim 41, wherein there are provided following step d) one or more assay reagents and dispersing said reagents to one or more reaction chambers in said apparatus.

44. (New) The method of claim 41, wherein said cells adhere to one or more cell growth chambers.

45. (New) The method of claim 41, wherein the apparatus further comprises a means, incorporated in said cell growth chamber, for cell growth, wherein one or more components of the apparatus are constructed of a gas permeable film or membrane such that CO<sub>2</sub>-buffered media can be used in the cell growth chamber and oxygen may permeate to the cells for their metabolism during growth.

46. (New) The method of claim 41, wherein said valve comprises a localized region of hydrophobicity within said chamber or said channel.

47. (New) The method of claim 41, wherein at least one of said assay reagents is labeled with a detectable label selected from the group consisting of fluorescent labels, chemiluminescent labels, bioluminescent labels, enzyme labels and radioactive labels.

48. (New) A method for measuring a cellular analyte, which method comprises the steps of:

a) providing an apparatus comprising;

- 1) a base plate supporting a plurality of micro-channel elements, each comprising a cell growth chamber, an inlet channel, and an outlet channel;
- 2) a cover plate positioned over said base plate said cover plate extending over said elements so as to define said chambers and channels; and
- 3) a hydrophobic barrier or valve in at least one of said chambers or said channels that is defined by positioning said cover plate over said base plate;

b) introducing said cells into said apparatus and causing said cells to be transported to one or more cell growth chambers in said apparatus;

c) culturing said cells in one ore more cell growth chambers;

d) providing one or more assay reagents and dispersing said reagents to one or more chambers in said apparatus; and

e) measuring the cellular analyte by optical means.

49. (New) The method of claim 48, wherein at least one of said assay reagents is labeled with a detectable label selected from the group consisting of fluorescent labels, chemiluminescent labels, bioluminescent labels, enzyme labels and radioactive labels.

50. (New) The method of claim 48, wherein the apparatus further comprises a means, incorporated in said cell growth chamber, for cell growth, wherein one or more components of the apparatus are constructed of a gas permeable film or membrane such that CO<sub>2</sub>-buffered media can be used in the cell growth chamber and oxygen may permeate to the cells for their metabolism during growth.

51. (New) The method of claim 48, wherein said valve comprises a localized region of hydrophobicity within said chamber or said channel.

52. (New) The method of claim 48, wherein said cells are derived from a species selected from the group consisting of human, rodents and simians.